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FOREST PEST MANAGEMENT
Pacific Southwest Region

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BIOLOGICAL EVALUATIONS OF LOVERS CAMP, INDIAN SCOTTY, SPRING FLAT, AND BRIDGE FLAT CAMPGROUNDS, SCOTT RIVER RANGER DISTRICT, KLAMATH NATIONAL FOREST

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ABSTRACT

Lovers Camp, Indian Scotty, Spring Flat, and Bridge Flat Campgrounds were evaluated for pest problems. The objective of the evaluations was to provide Forest Pest Management input to silvicultural prescriptions for planned salvage and rehabilitation logging at the campgrounds. Dwarf mistletoes on white fir and Douglas-fir, and potentially hazardous trees were observed at Lovers Camp. Management alternatives provided for consideration include 1) do nothing, 2) remove hazardous trees and sanitize, 3) patch cut and plant, and 4) move the campground. Pests at Indian Scotty, Spring Flat, and Bridge Flat Campgrounds included flat-headed borers associated with stressed Douglas-fir and western dwarf mistletoe on a few trees. The benefits of thinning to reduce future pest impact are discussed.

At the request of Robert Lindsay, District Ranger, Scott River District, we examined Lovers Camp and Indian Scotty Campgrounds on November 15 and 16, 1983. The objective of the evaluations was to provide Forest Pest Management input to silvicultural prescriptions for planned salvage and rehabilitation logging at the two campgrounds. During the evaluations, we were requested to also examine and provide similar input to the Spring Flat and Bridge Flat Campgrounds on the same District. District personnel accompanying us during part of the evaluations included Rick Svilich, Silviculturist; Charles Kraus, Planning Officer; Hoop George, Small Sales Officer; David Bosch, Lands and Recreation Officer; and Chuck Smith, Recreation Technician.

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LOVERS CAMP CAMPGROUND

Observations

The campground is within an old-growth mixed conifer forest at an elevation of approximately 4300 feet. It receives heavy use throughout most of the year from recreationists as a primary trail head or entrance to the adjacent Marble Mountains Wilderness Area. Site is Dunning Class 1 throughout. The overstory is composed of mature to overmature Douglas-fir, white fir, and a few sugar pine, incense-cedar, and ponderosa pine. The conifer understory -- where present in openings created by past, periodic salvage logging -- consists of white fir, Douglas-fir, incense-cedar, and scattered Pacific yew. Jeffrey pines have been planted in the vicinity of the corral area. Hardwoods, including chinkapin, maple, dogwood, and alder, are common in and adjacent to openings in the stand.

The major pest problem observed was moderate to heavy infection levels of white fir dwarf mistletoe (Arceuthobium abietinum f.sp. concoloris) and Douglas-fir dwarf mistletoe (A. douglasii) on most overstory trees. Infection levels in understory trees varied from none to moderate. Dwarf mistletoe bole cankers were common on overstory and understory white fir, and were consistently associated with the stem breakage of numerous white fir that had occurred throughout the campground and near adjacent trails. Numerous standing white fir had open dwarf mistletoe bole cankers, some with Pholiota adiposa fruiting from decayed wood.

Other disease problems noted were on incense-cedar and are of minor or no significance to the management objective of the area. These included rust (Gymnosporangium libocedri), true mistletoe (Phoradendron juniperinum ssp. libocedri), and pocket dry rot (Polyporus amarus). One incense-cedar with pocket dry rot and adjacent to a picnic table had broken off about 15 feet from the ground.

Although snow cover inhibited a thorough examination of stumps and roots, no evidence of a root disease problem was observed. Wind-thrown trees or trees with fading crowns were not present. Stumps examined were generally solid or had brown crumbly rot or Armillariella mellea decay, but no white rot or conks typical of Fomes annosus infection.

A few hazardous trees in addition to the white fir with bole cankers were observed. One overmature sugar pine adjacent to a picnic table had extensive internal decay associated with an old basal fire scar. One mature Douglas-fir near the old trail to the Scott River had a forked stem. Some white fir throughout the campground had basal or stem wounds with associated internal decay.

No insect problems were observed.

Management Alternatives

1. Do Nothing: The heavy levels of dwarf mistletoe now present will result in changes in stand structure and composition. The future stand will likely consist of an overstory of low vigor Douglas-fir with dead tops and mistletoe brooms, and white fir with open bole cankers. Understory trees developing in openings will consist of white fir and some Douglas-fir of poor form and vigor because of dwarf mistletoe, and incense-cedar and hardwoods. Pine regeneration will be over-topped by the mistletoe-infected white fir and Douglas-fir. The continuing deterioration of the stand and increasing hazard will lower its asethetic value to recreationists.

Dwarf mistletoe in both white fir and Douglas-fir will continue to intensify in overstory and understory trees and will spread to adjacent susceptible species. White fir with open bole cankers will fail because of associated decay and will present a hazard to recreationists and structures within the stand. Bole cankers will continue to develop on additional white fir as the dwarf mistletoe intensifies in the understory. These cankered trees will provide a continued source of hazardous trees. Mature and overmature Douglas-fir in the overstory with heavy dwarf mistletoe infection and associated brooming will continue to be stressed and will die, probably after attack by the flatheaded fir borer. Brooms and dead tops on the weakened or killed trees will provide an additional source of hazard to humans and structures. Trees that are blown down will wound adjacent white fir. These wounds will provide entrance courts for decay fungi and additional blowdown will occur.

Conifer regeneration, primarily white fir and incense-cedar, will occur in natural openings created by death or blowdown of overstory white fir and Douglas-fir. This regeneration will fill in the areas where the current overstory is preventing establishment of replacement trees, but the white fir will become infected with dwarf mistletoe, resulting in poor form and vigor and will not develop into replacement trees of the type preferred by most recreationists.

2. Remove Hazardous Trees and Sanitize: This alternative would reduce the potential impact of existing hazardous trees by removing white fir with open dwarf mistletoe bole cankers and other identified hazardous trees, and would increase stand vigor and reduce current dwarf mistletoe impact by removing overstory trees heavily infected with dwarf mistletoe.

Management of hazardous trees involves a continuous surveillance and identification program. Identification of hazardous trees requires an understanding of the tree species, their defects and resulting probability of failure, and the local environmental conditions. Identification needs to be followed by the taking of appropriate action to minimize or eliminate the potentially hazardous situations.

Stem swellings, resulting from stem infection by dwarf mistletoe when the host trees were young, are prevalent on white fir in the campground and are potentially hazardous. The swelling does not weaken the tree as

long as the swelling remains alive, but as the cambium dies in the oldest part of the swelling, the bark becomes broken, decay-causing fungi enter, and an open canker is created. As the decay progresses, the trunk is weakened and may break at the canker site under the stress of heavy wind or snow conditions. The tree is subject to breakage when the width of the dead face approaches one-half the circumference of the swelling. These white fir, especially those within range of potential targets (structures, parking lots, roads, and trails) should be removed first.

Other potentially hazardous trees are present at Lovers Camp Campground. Because true fir is especially subject to decay, those with evidence of past wounding are subject to failure. Trees with heart rot associated with fire scars, such as the sugar pine adjacent to a picnic table, are subject to breakage during storms. Few hazards are usually associated with Douglas-fir because of the high mechanical strength of its wood. However, the Douglas-fir with two large main forks is potentially hazardous during storm conditions. Incense-cedar is usually not considered hazardous in recreational areas even when pocket dry rot is present. The fact that one large incense-cedar did have stem breakage indicates that it was in an exposed location.

Removal of some overstory trees which are heavily infected with dwarf mistletoe would aid in slowing, but would not prevent, the intensification of the disease, and would also reduce the number of trees in the stand that are susceptible to successful bark beetle attack. Thinning that discriminates against less desirable and more heavily infected individuals would increase the vigor of the remaining white fir trees and thus reduce the impact of dwarf mistletoe, given that the residual trees are capable of responding to release.

Pruning of dwarf mistletoe brooms on overstory trees that are desirable to retain because of their location or character is not appropriate at Lovers Camp. Although broom removal has increased the vigor and extended the life of pines if at least 30 percent live crown remains after pruning, it has not been demonstrated that the same holds true for Douglas-fir or white fir. Furthermore, because of the heavy levels of infection at the campground, there are few, if any, trees that would have 30 percent live crown remaining after broom pruning. In addition, broom pruning would not reduce the spread of dwarf mistletoe in the stand because infections would remain above the highest broom.

Conifer stumps created during sanitation should be treated with borax (sodium tetraborate decahydrate, EPA Reg. No. 1624-94). Application of borax immediately after felling will prevent most infection from occurring (see FSM 2305, 2331.33 R-5 Supplement No. 90).

3. Patch Cut and Plant: A series of small (1/4 to 1/2 acre) patch cuts, followed by planting, would have several benefits. Conifer regeneration is now absent under the old-growth overstory. The patch cuts would remove potentially hazardous and dwarf mistletoe-infected trees and allow regeneration to develop for eventual replacement of stagnant old-growth trees. Incense-cedar and white fir are now common

in the natural openings. If the patch cuts are left for natural regeneration, incense-cedar, white fir, or brush would probably develop. Planting, primarily with Douglas-fir, would better utilize the site. If Douglas-fir is planted, overstory Douglas-fir infected with dwarf mistletoe and within 100 feet of the regeneration should be cut to eliminate or reduce the spread of the dwarf mistletoe to the planted seedlings.

Favoring Douglas-fir over white fir for planting would have several advantages. Douglas-fir is longer-lived than white fir and would better utilize the site over the long-term. White fir are more likely to develop into potentially hazardous trees because of their susceptibility to decay following wounding and after development of open dwarf mistletoe bole cankers.

Pines could be planted in the openings without fear of dwarf mistletoe developing, but they would likely be outgrown and soon overtopped by natural Douglas-fir or white fir regeneration. The planting or encouragement of naturally-occurring hardwoods such as dogwood would increase species diversity and reduce dwarf mistletoe impact in the future stand.

4. Move the Campground: This alternative would involve closing the present Lovers Camp Campground and establishing another campground at a nearby location. Closing the present campground would allow rehabilitation to occur for eventual re-opening or allow use of the productive site for timber production. Because of the current high use of Lovers Camp, any alternate site chosen should have good accessibility to the public and the Marble Mountains Wilderness. The site should also, ideally, have fewer potentially hazardous trees, lower levels of dwarf mistletoe infestation, and a lower potential for the development of other pest problems than the present site.

An educational program should be considered in this high-use campground if alternatives other than do nothing are implemented. The public may adversely react to the the removal of dwarf mistletoe-infected old growth trees, hazardous trees, and the removal of all conifers in the patch cuts. Their reaction may be more favorable if an educational program is initiated -- involving signing and other means of information dispersal -- explaining benefits to be gained through integrated pest management. For example, a white fir broken off at a dwarf mistletoe canker could be left, and a sign placed on the tree explaining why similar white firs are being removed from the campground.

INDIAN SCOTTY CAMPGROUND

Observations

Indian Scotty Campground is situated along the Scott River at an elevation of 2300 feet. The rocky soil (Forest Survey Site Class 5) supports a stand of overstocked sapling and pole-sized Douglas-fir. Ponderosa pine, incense-cedar, sugar pine and scattered oaks are also present.

The ponderosa pine are generally of low vigor, with tip and branch dieback and poor needle retention, presumably due to low site and competition from other vegetation. Current western pine beetle (Dendroctonus brevicomis) attacks were noted on three pole-sized ponderosa pine at Camp 8, and flatheaded borers were found in two ponderosa pine saplings at Camp 26 and in one dead 12 inch dbh ponderosa pine east of Camp 28. One 24 inch dbh ponderosa pine at Camp 36 had numerous dwarf mistletoe brooms. Dwarf mistletoe was not observed in other areas of the campground. Blister rust was not observed on the sugar pines, but numerous seedlings and saplings had branch flagging and some tip dieback. Unidentified tip weevils were associated with the sugar pine damage.

In addition to the pest organisms present, several potentially hazardous tree situations were observed. Some of the overstory Douglas-fir, most notably at the parking lot for the Group Campground Area, had dead tops associated with animal or mechanical damage. Oak branches with internal decay were hanging over the restroom structure near Camp 32, and over the picnic tables at the Group Camp area.

Stocking densities varied from 200 to 240 square feet in aggregates we measured. Overstocking, especially in combination with a low productivity site, creates stress and increases the probability of bark beetle attack. The probability is increased further when additional stress, like drought, occurs.

Management Alternatives

1. Do Nothing: The few pest problems present are not currently affecting management objectives. However, the potential for pest damage will increase as competition increases or during the next period of lower than normal rainfall. Beetles and flatheaded borers will continue to remove stressed ponderosa pine from the stand. The Douglas-fir in the dense, overstocked aggregates will continue to compete for moisture, become susceptible to flatheaded borer damage or activity, and continue to prevent establishment and development of screening vegetation in the understory.

2. Thin Douglas-fir: The reduction of basal area in portions of the campground by selectively thinning Douglas-fir from below would have several benefits. The potential for future pest problems would be reduced because of increased tree and stand vigor. Maintaining stocking densities at levels appropriate for the site is a critical factor in promoting vigorous tree growth and reducing the possibility of insect-related mortality. Thinning to increase tree vigor would permit the land manager to remove trees he selected rather than have bark beetles and borers select the trees.

Thinning would also provide opportunities for regulation of species composition and increased screening of camp sites. Leaving the oaks that are now present in the campground and thinning the adjacent Douglas-fir (for example, at Camp 5, Camp 12, and other areas) would increase species diversity and still provide, or increase, shading of

camp sites. At Camp 10, for example, which currently has a large proportion of pine, the pines could be discriminated against while thinning, and the oaks and Douglas-fir favored.

Thinning would not decrease current levels of screening. The dense aggregations of Douglas-fir stems now present throughout the campground are both inefficient and ineffective as screening. Thinning would provide the opportunity to create openings in which more desirable screening vegetation, such as Ceanothus, dogwood, or incense-cedar, could be planted.

Because there is no pressing pest management reason for immediate thinning, the thinning could be done in stages, as time and funding are available. This would offer the opportunity to prescribe, implement and monitor various thinning levels in different parts of the campground to observe if the desired effects are achieved.

SPRING FLAT AND BRIDGE FLAT CAMPGROUNDS

Observations

The two campgrounds are also located along the Scott River, adjacent to the main highway, at an elevation of approximately 2200 feet. Site and vegetation are similar to those at Indian Scotty Campground, except for the upper loop at Spring Flat, which is of somewhat higher site quality, and supports larger trees.

Overstocked aggregations of sapling and pole-sized Douglas-fir associated with desirable specimen trees, and insect attack (sugar pine killed by mountain pine beetle, Dendroctonus ponderosae; flatheaded fir borer, Melanophila drummondi, in stressed Douglas-fir) were the primary problems observed at Spring Flat Campground. Western dwarf mistletoe, Arceuthobium campylopodum, and associated brooming was observed on one 14 inch dbh ponderosa pine at the entrance to the upper loop (just east of Camp 1). The only pest observed at Bridge Flat Campground was the flatheaded fir borer, associated with dead Douglas-firs on the steep river bank.

Discussion

The management alternatives discussed for Indian Scotty Campground would generally apply at these two campgrounds. While pests are not currently impacting the campgrounds, they undoubtedly will with the passage of time. The opportunity exists now to develop and implement vegetative management plans -- plans which include insect and disease considerations -- in order that future pest-associated damage be prevented. Reducing the density of Douglas-fir stems in the lower loop of Spring Flat would prolong the life of specimen sugar pine, Douglas-fir, and incense-cedar by reducing competition. Excessive understory competition may have already contributed to the death of one specimen sugar pine. The other benefits of thinning -- i.e., increasing species diversity and screening by favoring vegetation already present in the understory -- apply equally well to these two campgrounds.